

**WHAT IS CLAIMED IS:**

1. A pharmaceutical composition comprising an amount of a molecular complex effective for treatment or prevention of an infectious disease or cancer, and a pharmaceutically acceptable carrier, said molecular complex comprising an alpha (2) 5  
macroglobulin polypeptide noncovalently associated with an antigenic molecule which displays the antigenicity of an antigen of an infectious agent or an antigen overexpressed in a cancer cell relative to its expression in a noncancerous cell of said cell type.
2. The pharmaceutical composition of Claim 1 wherein the antigenic molecule 10  
displays the antigenicity of an antigen of an infectious agent.
3. The pharmaceutical composition of Claim 1 wherein the antigenic molecule displays the antigenicity of an antigen overexpressed in a cancer cell relative to its expression in a noncancerous cell of said cell type. 15
4. The pharmaceutical composition of Claim 1 wherein the antigenic molecule is a tumor specific antigen or a tumor-associated antigen.
5. A pharmaceutical composition comprising an amount of a fusion protein 20  
effective for treatment or prevention of an infectious disease or cancer, and a pharmaceutically acceptable carrier, said fusion protein comprised of an alpha (2) macroglobulin polypeptide and an antigenic molecule which displays the antigenicity of an antigen of an infectious agent or an antigen overexpressed in a cancer cell relative to its expression in a noncancerous cell of said cell type. 25
6. The pharmaceutical composition of Claim 1 wherein the molecular complex is purified.
7. A purified molecular complex comprising an alpha (2) macroglobulin 30  
polypeptide noncovalently associated with an antigenic molecule of an infectious agent or an antigen overexpressed in a cancer cell relative to its expression in a noncancerous cell of said cell type.
8. A purified population of molecular complexes in which at least 65% of said 35  
complexes comprise an alpha (2) macroglobulin noncovalently associated with an antigenic molecule.

9. A purified population of molecular complexes purified from a recombinant cell in which at least 65% of said complexes comprise an alpha (2) macroglobulin noncovalently associated with an antigenic molecule.

5

10. A recombinant cell infected with a pathogen and transformed with a nucleic acid comprising a nucleotide sequence that (i) is operably linked to a promoter, and (ii) encodes an alpha (2) macroglobulin polypeptide, which alpha (2) macroglobulin polypeptide associates with an antigenic molecule, when said antigenic molecule is present, to form a complex that in sufficient amount is capable of eliciting an immune response to the antigenic molecule.

10

11. A recombinant cancer cell transformed with a nucleic acid comprising a nucleotide sequence that (i) is operably linked to a promoter, and (ii) encodes an alpha (2) macroglobulin polypeptide, which alpha (2) macroglobulin polypeptide associates with an antigenic molecule, when said antigen is present, to form a complex that in sufficient amount is capable of eliciting an immune response to the antigenic molecule.

15

12. A recombinant cell transformed with (i) a first nucleic acid comprising a first nucleotide sequence that is operably linked to a first promoter and encodes an alpha (2) macroglobulin polypeptide, and (ii) a second nucleic acid comprising a second nucleotide sequence that is operably linked to a second promoter and encodes an antigenic molecule, such that the alpha (2) macroglobulin polypeptide and the antigenic molecule are expressed within the cell and associate with each other to form a complex that in sufficient amount is capable of eliciting an immune response to the antigenic molecule.

20

25

13. The recombinant cell of Claim 10, 11, or 12 which is a human cell.

14. A pharmaceutical composition comprising the recombinant cell of any one of Claims 10, 11, or 12 and a pharmaceutically acceptable carrier.

30

15. A method for preparing a complex of an alpha (2) macroglobulin polypeptide noncovalently associated with an antigenic molecule, said alpha (2) macroglobulin polypeptide comprising:

35

- (a) culturing a cell transformed with a nucleic acid comprising a nucleotide sequence encoding the alpha (2) macroglobulin polypeptide, under conditions such that said alpha (2) macroglobulin

polypeptide is expressed by the cells and associates with an antigenic molecule of the cell; and

- (b) recovering a population of complexes of the alpha (2) macroglobulin polypeptide noncovalently associated with antigenic molecules from the cells.

16. A method for preparing an alpha (2) macroglobulin polypeptide noncovalently associated with antigenic molecules derived from one or more antigens of an infectious agent, comprising:

- (a) culturing infected cells, transformed with a nucleic acid comprising a nucleotide sequence encoding the alpha (2) macroglobulin polypeptide, or fragment, analog, or variant thereof, and operably linked to a promoter, under conditions such that the alpha (2) macroglobulin polypeptide is expressed by the cells and associates with peptides of the cells; and
- (b) recovering from the cells a population of complexes of the alpha (2) macroglobulin polypeptide noncovalently associated with peptides derived from the infectious agent.

17. The method of Claim 15 or 16, further comprising purifying the complexes.

18. The method of Claim 15 or 16, further comprising purifying the complexes by affinity chromatography.

19. A method of treating or preventing an infectious disease in an individual having an infectious disease comprising administering to the individual an immunogenic amount of purified complexes comprising an alpha (2) macroglobulin polypeptide noncovalently associated with a first antigenic molecule, wherein the first antigenic molecule displays the antigenicity of an antigen of an infectious agent of the infectious disease.

20. The method of Claim 19, further comprising, before, concurrently or after administration of the immunogenic complex, administering to the individual a composition comprising antigen presenting cells sensitized *in vitro* with a sensitizing amount of a second complex of alpha (2) macroglobulin polypeptide noncovalently associated with a second antigenic molecule, said second antigenic molecule displaying the antigenicity of a second antigenic molecule of said infectious agent.

21. A method of treating or preventing an infectious disease in a subject having an infectious disease comprising:

- (a) culturing an infected cell transformed with a nucleic acid comprising a nucleotide sequence encoding an alpha (2) macroglobulin polypeptide, said infected cell displaying the antigenicity of an antigen of an infectious agent of the infectious disease, said nucleotide sequence being operably linked to a promoter, under conditions such that the alpha (2) macroglobulin polypeptide is expressed by the infected cells and associates with antigenic molecules of the cell;
- (b) recovering complexes of the alpha (2) macroglobulin polypeptide noncovalently associated with antigenic molecules from the infected cell; and
- (c) administering to the subject an amount of the recovered complexes effective to treat or prevent the infectious disease.

22. The method of Claim 21, further comprising, prior to step (a), the step of obtaining infected cells from the subject and transforming the infected cells with the nucleic acid.

23. The method of Claim 21, further comprising, prior to step (a), the step of obtaining the infected cell from one or more individuals and transforming the infected cells with the nucleic acid, said one or more individuals being different from the subject and having the same type of infectious disease as the subject.

24. A method of treating or preventing an infectious disease in a subject having an infectious disease comprising:

- (a) culturing a recombinant cell transformed with (i) a first nucleic acid encoding an alpha (2) macroglobulin polypeptide and (ii) a second nucleic acid encoding an antigenic molecule displaying the antigenicity of an antigen of an infectious agent of the infectious disease;
- (b) recovering complexes of the alpha (2) macroglobulin polypeptide noncovalently associated with the antigen; and
- (c) administering to the subject an amount of the recovered complexes effective to treat or prevent the infectious disease.

25. The method of Claim 19, 21, or 24, in which the infectious disease is caused by an infectious agent selected from the group consisting of a virus, a bacterium, a fungus, and a parasite.

5

26. A method of treating or preventing cancer in an individual having a type of cancer or in whom prevention of a type of cancer is desired comprising administering to the individual an immunogenic amount of purified complexes comprising an alpha (2) macroglobulin polypeptide noncovalently associated with a first antigenic molecule, wherein  
10 either (a) the first antigenic molecule displays antigenicity of said type of cancer or a metastasis thereof; or (b) the complex is obtained by recovering complexes from said type of cancer cells or a metastasis thereof that recombinantly express the alpha (2) macroglobulin polypeptide.

15

27. The method of Claim 26, further comprising, before, concurrently or after administration of the immunogenic complex, administering to the individual a composition comprising antigen presenting cells sensitized *in vitro* with a sensitizing amount of a second complex of an alpha (2) macroglobulin noncovalently associated with a second antigenic molecule, said second antigenic molecule displaying the antigenicity of an antigen  
20 overexpressed in a cancer cell relative to its expression in a noncancerous cell of said cell type.

28. The method of Claim 26, wherein the first antigenic molecule is an antigen overexpressed in a cancer cell relative to its expression in a noncancerous cell of said cell  
25 type.

29. The pharmaceutical composition of Claim 26, wherein the antigenic molecule is a tumor-specific antigen or a tumor-associated antigen.

30. A method of treating or preventing cancer in a subject having a type of cancer or in whom prevention of a type of cancer is desired comprising:

(a) culturing a cancer cell of said type transformed with a nucleic acid comprising a nucleotide sequence encoding an alpha (2) macroglobulin polypeptide said nucleotide sequence being operably  
35 linked to a promoter, under conditions such that the alpha (2) macroglobulin polypeptide is expressed by the cancer cell and associates with at least one antigenic molecule of the cell;

- (b) recovering complexes of the alpha (2) macroglobulin polypeptide noncovalently associated with at least one antigenic molecule from the cancer cell; and
- (c) administering to the subject an amount of the recovered complexes effective to treat or prevent cancer.

31. The method of Claim 30, further comprising, prior to step (a), the step of obtaining cancer cells from the subject and transforming the cancer cells with the nucleic acid.

32. The method of Claim 30, further comprising, prior to step (a), the step of obtaining cancer cells from one or more individuals and transforming the cancer cells with the nucleic acid, said one or more individuals being different from the subject and having the same type of cancer as the subject.

33. A method of treating or preventing cancer in a subject having a type of cancer or in whom prevention of a type of cancer is desired comprising:

- (a) culturing a recombinant cell transformed with (i) a first nucleic acid encoding an alpha (2) macroglobulin polypeptide, and (ii) a second nucleic acid encoding an antigenic molecule displaying the antigenicity of an antigen of a cancer cell;
- (b) recovering complexes of the alpha (2) macroglobulin polypeptide noncovalently associated with the antigen; and
- (c) administering to the subject an amount of the recovered complexes effective to treat or prevent cancer.

34. The method of Claim 26, 30, or 33, in which the type of cancer is selected from the group consisting of fibrosarcoma, myxosarcoma, liposarcoma, chondrosarcoma, osteogenic sarcoma, chordoma, angiosarcoma, endotheliosarcoma, lymphangiosarcoma, lymphangioendotheliosarcoma, synovioma, mesothelioma, Ewing's tumor, leiomyosarcoma, rhabdomyosarcoma, colon carcinoma, pancreatic cancer, breast cancer, ovarian cancer, prostate cancer, squamous cell carcinoma, basal cell carcinoma, adenocarcinoma, sweat gland carcinoma, sebaceous gland carcinoma, papillary carcinoma, papillary adenocarcinomas, cystadenocarcinoma, medullary carcinoma, bronchogenic carcinoma, renal cell carcinoma, hepatoma, bile duct carcinoma, choriocarcinoma, seminoma, embryonal carcinoma, Wilms' tumor, cervical cancer, testicular tumor, lung carcinoma, small cell lung

carcinoma, bladder carcinoma, epithelial carcinoma, glioma, astrocytoma, medulloblastoma,  
craniopharyngioma, ependymoma, pinealoma, hemangioblastoma, acoustic neuroma,  
oligodendroglioma, meningioma, melanoma, neuroblastoma, retinoblastoma, leukemia,  
5 lymphoma, multiple myeloma, Waldenström's macroglobulinemia, and heavy chain disease.

35. A method for treating an autoimmune disorder comprising administering to a  
mammal in need of such treatment an antibody specific for alpha (2) macroglobulin.

10 36. The method of Claim 35, wherein the antibody is purified.

15

20

25

30

35